Lamprey River Instream Flow Pilot Program

PISF Tasks and the WMPAAC

October 7, 2005

WMPAAC Meeting

Raymond Fire Dept.

LOA (List of Acronyms)

- **PISF** – Protected Instream Flow
- **WMPA** – Water Management Planning Area (watershed of the Designated River)
- **WMPAAC** and **TRC** – Stakeholder and Technical committees

LOA (List of Acronyms)

- **AWUs** – water users required to be registered and having a withdrawal or return location within 500 feet of a designated river or tributary

- **ADOs** – dam owners with an impoundment with a surface area greater than 10 acres

- **IPUOCRs –** Protected entities listed in RSA 483 and Designated Uses under the Clean Water Act (derived from Instream Protected Uses, Outstanding Characteristics, Resources)

Objectives of the Protected Instream Flow Study

- Identify IPUOCR entities
- Assess IPUOCR flow needs
- Document results of PISF assessment

Objectives of the Water Management Plan

- Assess management needs
- Create three sub-plans with a range of alternatives with costs
  - Water conservation plan (demand management)
  - Dam management plan (supply management)
  - Water use plan (operational management)
- Select actions for each ADO and AWU to meet PISF and create implementation schedule

Lamprey Project Team

- **Normandeau Associates**
  - Limnology, aquatic ecology, aquatic ecosystem restoration, impact assessment, permitting, natural resource damage assessment, field methods
- **University of New Hampshire**
  - Hydrology, hydraulics, geomorphology, ground water, water resources management, economics, financial possibilities, management plan
- **University of Massachusetts**
  - Instream flow, habitat modeling, fish ecology, fisheries management, field methods

WMPA Advisory Committee

- ***Qualifications:*** Members shall represent a local entity
- ***Duties:*** - To provide information towards the completion of protected instream flow studies and water management plans
  - To review and comment on WMPs
  - Submit annual progress reports

ISFR Pilot Program Consultant Tasks

- Task 1. Draft List of Protected Entities
- Task 2. Assessment of Well Withdrawal Impacts on Surface Water
- Task 3. On-Stream Survey for Protected Entities
- Task 4. Report Describing Protected Entities and Proposed PISF Methods
- Task 5. PISF Assessments and Proposed PISF Report
- Task 6. PISF Public Hearing (JOINTLY with the legislature)
- Task 7. PISF Report for the Lamprey River
- Task 8. Assessment of Water Use with the Established PISF
- Task 9. Development of WMP Sub-Plans
- Task 10. Proposed WMP
- Task 11. WMP Public Hearing (JOINTLY with the legislature)
- Task 12. WMP for Lamprey River

Lamprey since last WMPAAC meeting

- July 13 - G&C approves contract with Normandeau Associates (NAI)
- Task 1 - Draft IPUOCR list - Done
- Task 3 - On-stream survey of IPUOCR entities – Done

- Task 2 – Groundwater/surface water interactions – begun

What’s coming next?

Task 2 – Groundwater and Surface Water Interaction Study

- Determine how much river water is coming each groundwater withdrawal

Task 2 - Well drawing water from aquifer and from river

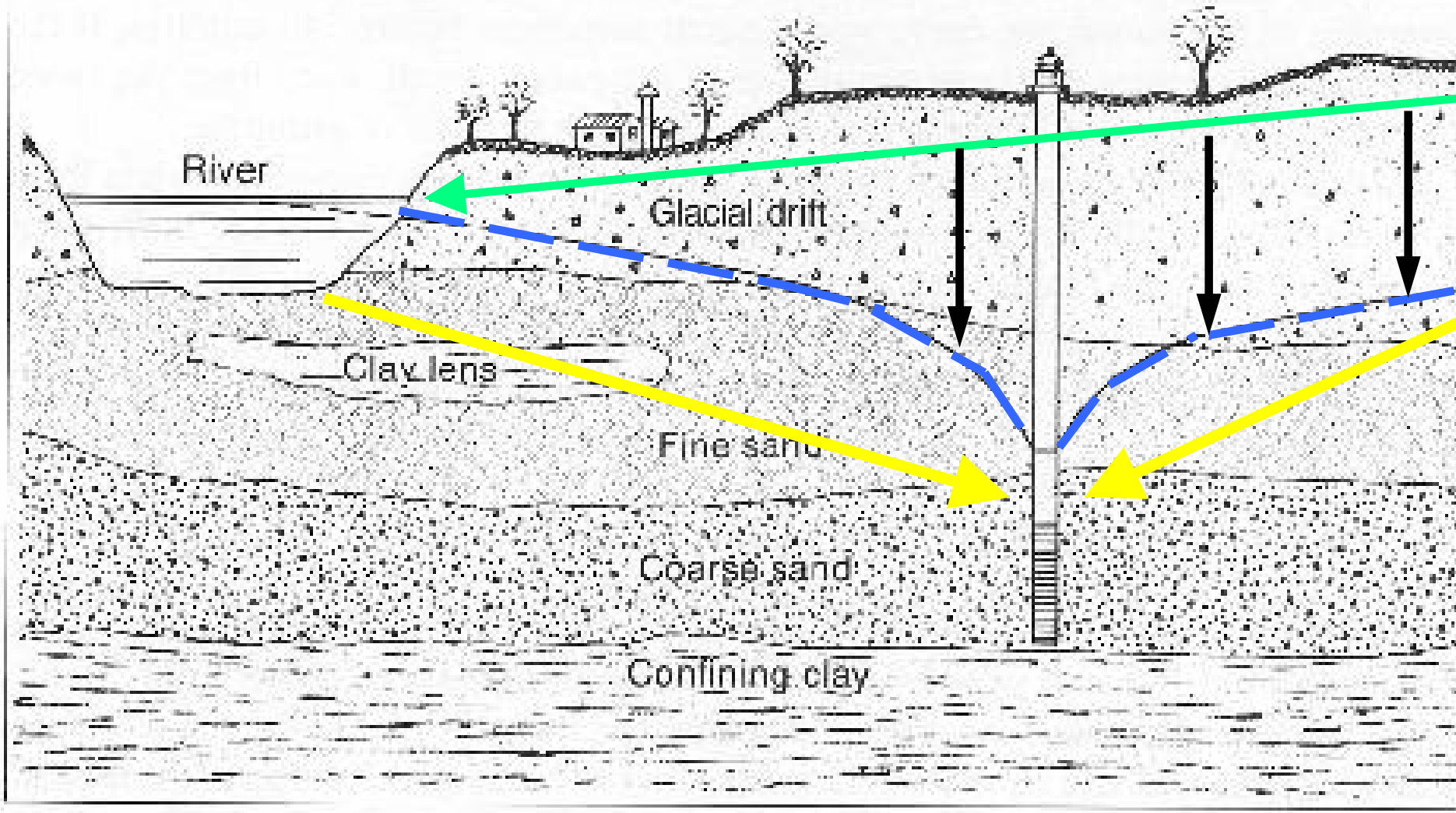


Figure 9.17. Cone of depression expanding beneath a riverbed creates a hydraulic gradient between the aquifer and river. This can result in induced recharge to the aquifer from the river.

What does WMPAAC do?

Task 2

- Understand that:
  - GW and SW are interconnected
  - Groundwater use has impacts on surface water quantity and quality
  - Water used locally has the least impact

Task 1 and 3 – IPUOCR List and On-stream survey

- Result is the final draft IPUOCR list
- List is divided into “flow-dependent” and “non-flow dependent”
- Flow-dependent entities are assessed for flow needs
- Flow assessments are proposed and approved during Task 4

What does WMPAAC do?

Task 1 and 3

- Review and comment on the IPUOCR list completeness
- Review and comment on the flow-dependent natures of the IPUOCRs
- Understand the range of methods to be used in the flow assessments

Task 4 – IPUOCR and Assessment Methods Report

- Documents the final list of protected entities (IPUOCRs)

- Identifies methods for determining flows for flow-dependent IPUOCRs
  - MesoHABSIM
  - Floodplain Transect Model
  - Recreational user surveys

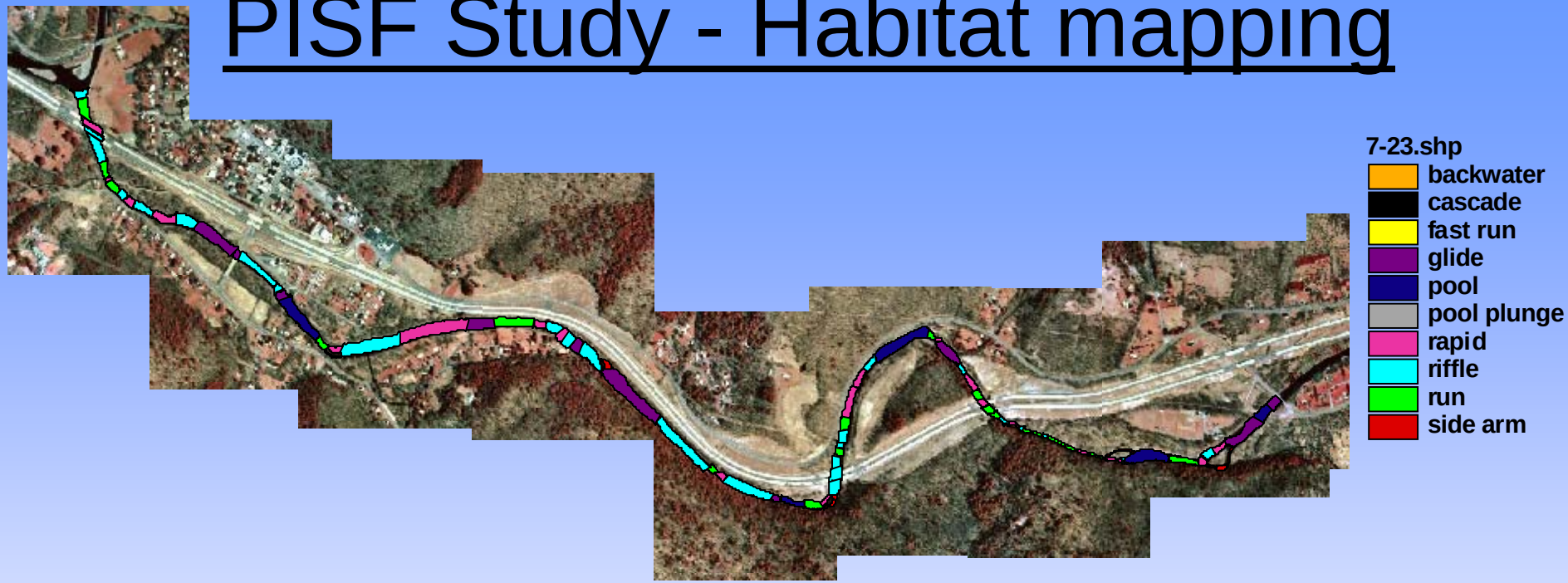
Task 5 - PISF Assessments and Proposed PISF Report

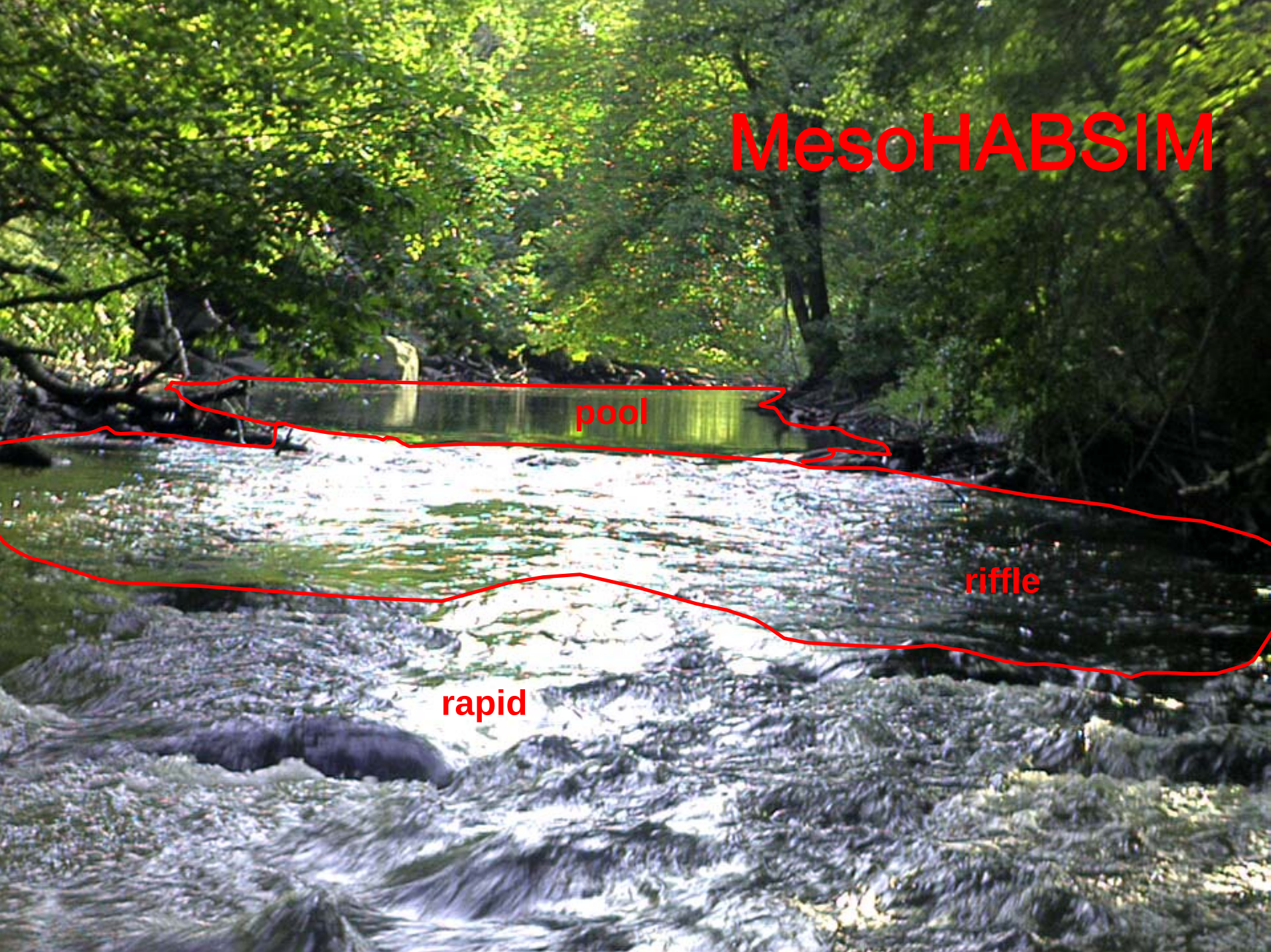
- Concepts
  - Rivers should have river fish communities
  - Goal: “Define the fish community that is appropriate for a natural river in southern New England” (Bain and Meixler, 2000)
  - Assumption: Biological integrity should be maintained and is defined by “a balanced, integrated, adaptive community” (Karr, 1991)

Task 5 – Concepts re Flow

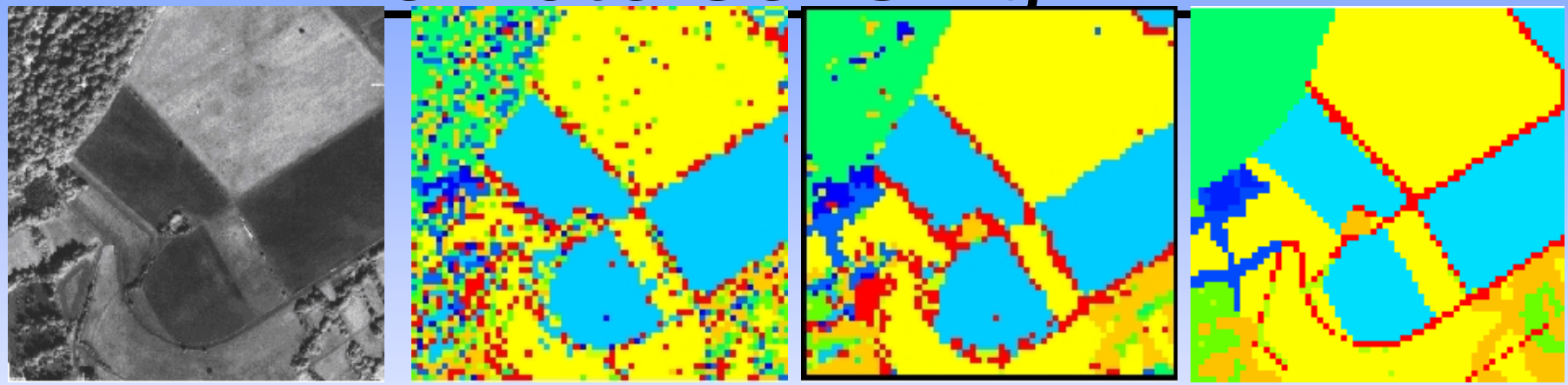
- Natural Flow Paradigm (Poff et al., 1997)
  - Natural populations are supported by natural flows
  - Components to describe natural flow include magnitude, duration, frequency, timing, and rate of change
  - Flow is a major component of habitat, but not the only component (riparian buffers, in-channel habitat)

PISF Study - Habitat mapping



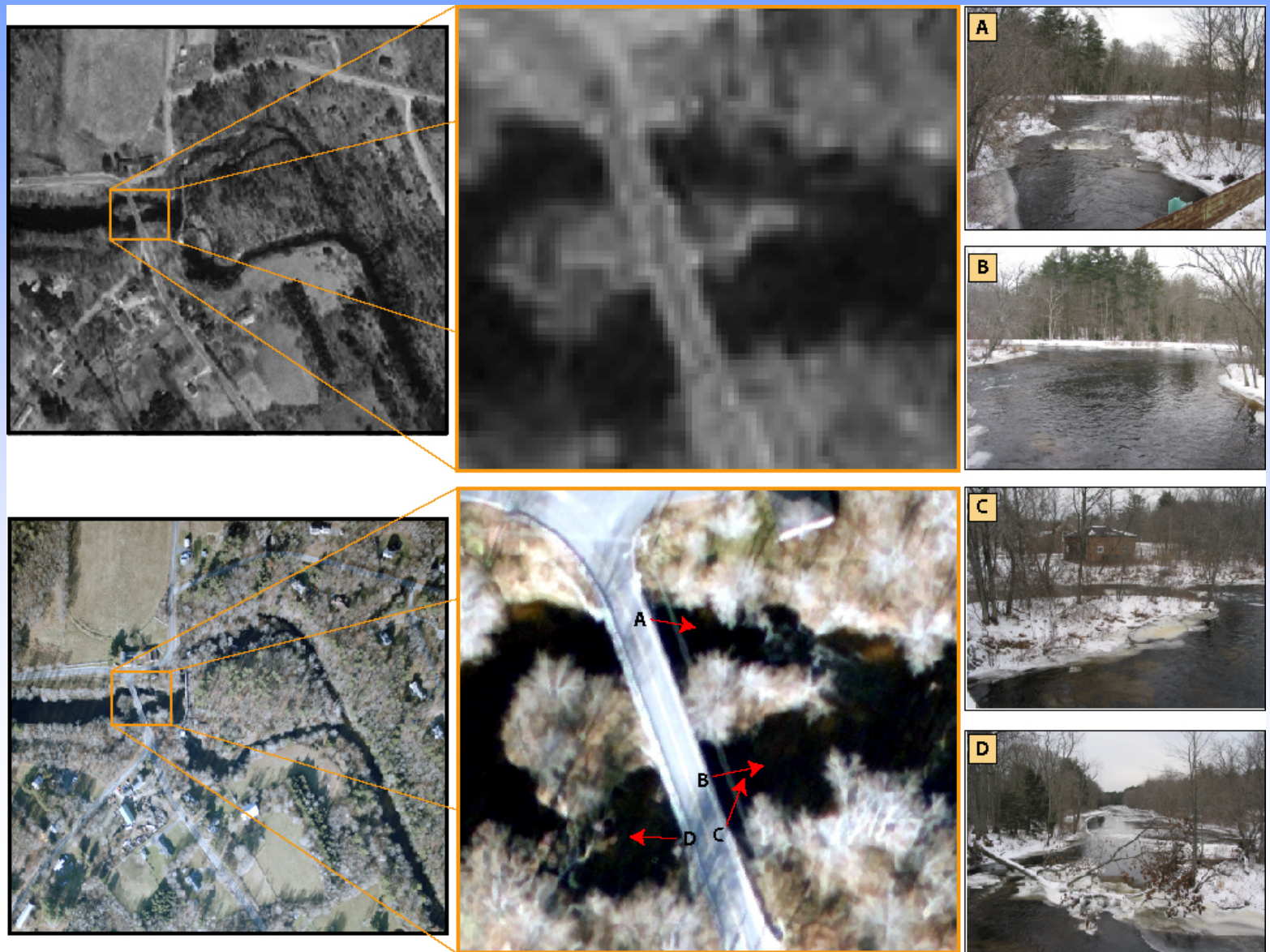

MesoHABSIM
pool
riffle
rapid

Lamprey includes multi-flow habitat assessments using remote sensing . . .



- 1. Black and white aerial imagery
- 2. An initial segmentation
- 3. Iterations of the algorithm
- 4. A “perfect” hand-generated segmentation.

. . . based on high-resolution aerial photography

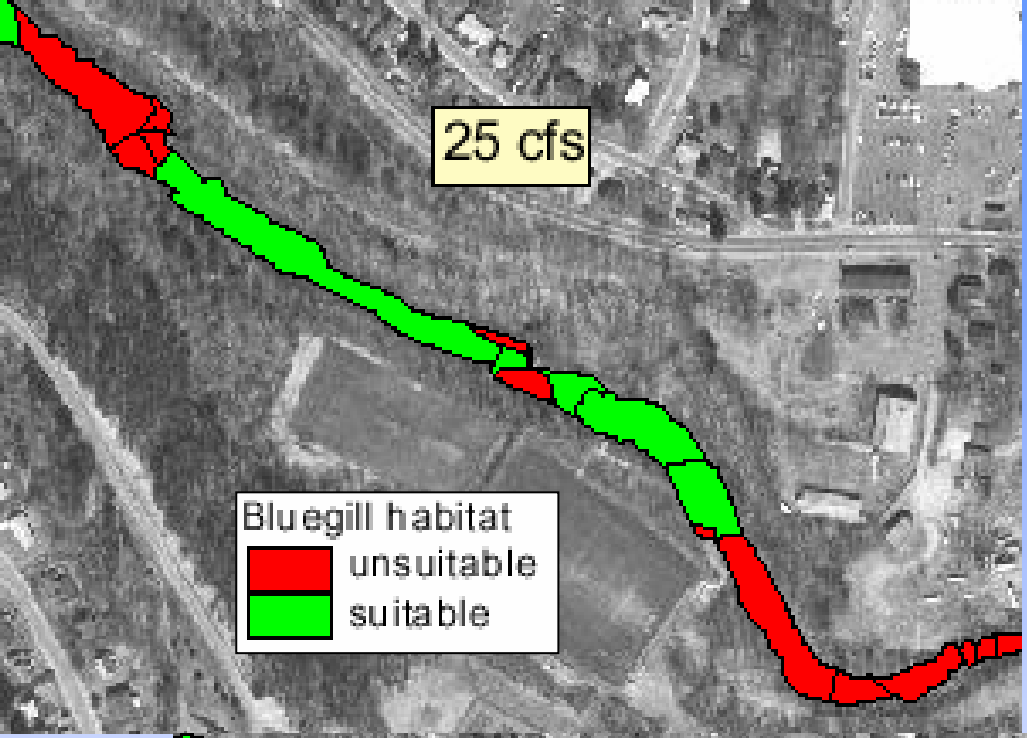


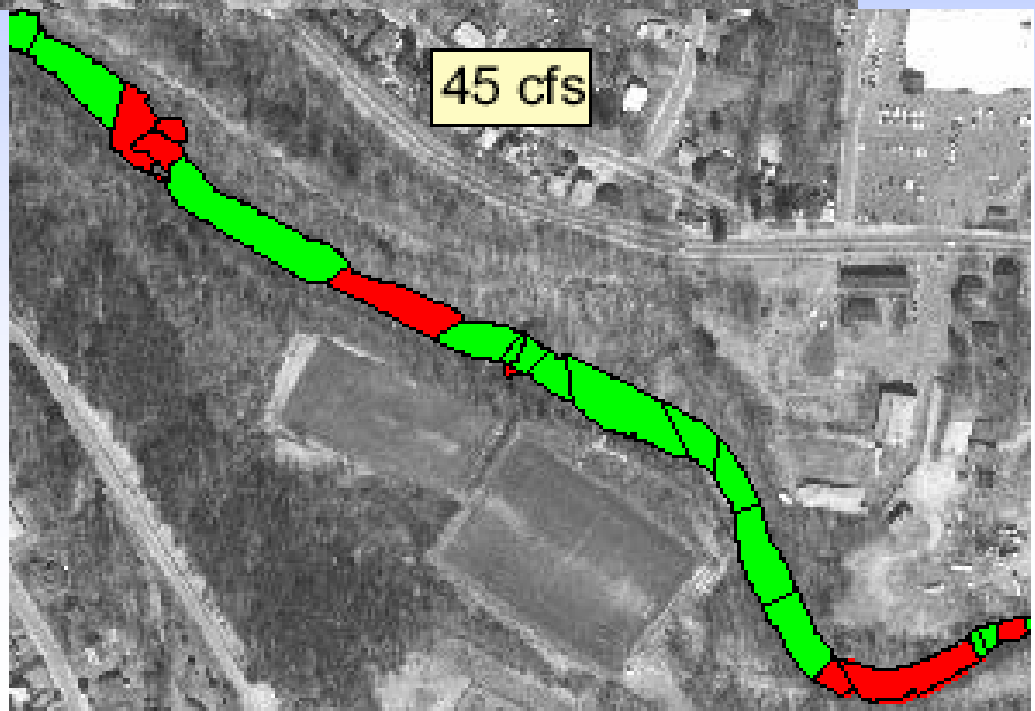
Multivariate analysis defines habitat suitability

FALLFISH

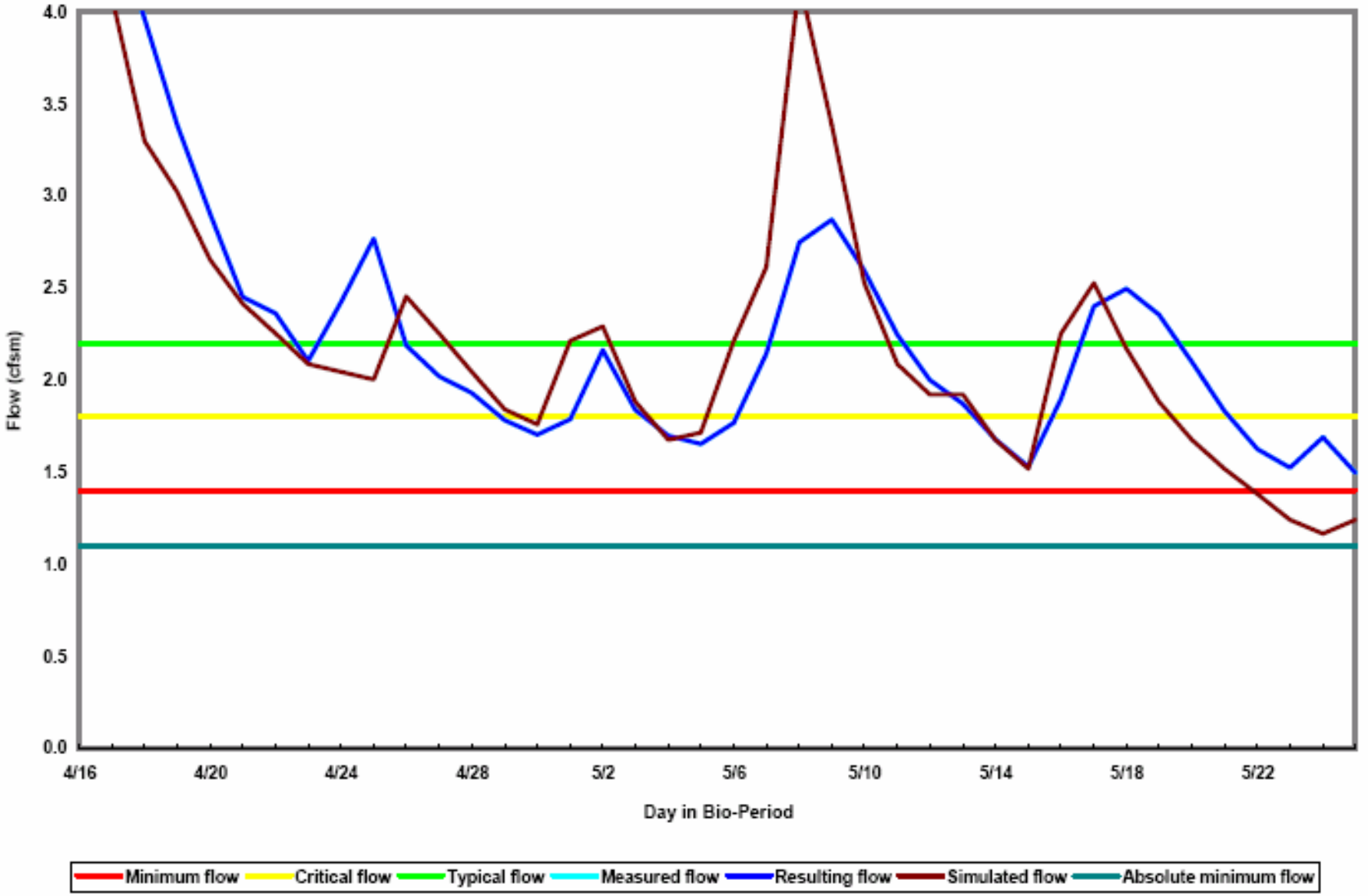
Presence (*76%*)		**Beta**
	BOULDER	**1.95**
	SHADING	**-1.07**
	DEPTH 0-25 cm	**-1.76**
	VELOCITY 45-60 cm/s	**1.06**
	RUN	**-0.57**
High abundance (*60%*)		
	Overhanging vegetation	**-0.97**

Habitat Mapping at Multiple Flows to Create Rating Curve of Habitat to Flow





Protected flows with action plans



What does WMPAAC do?

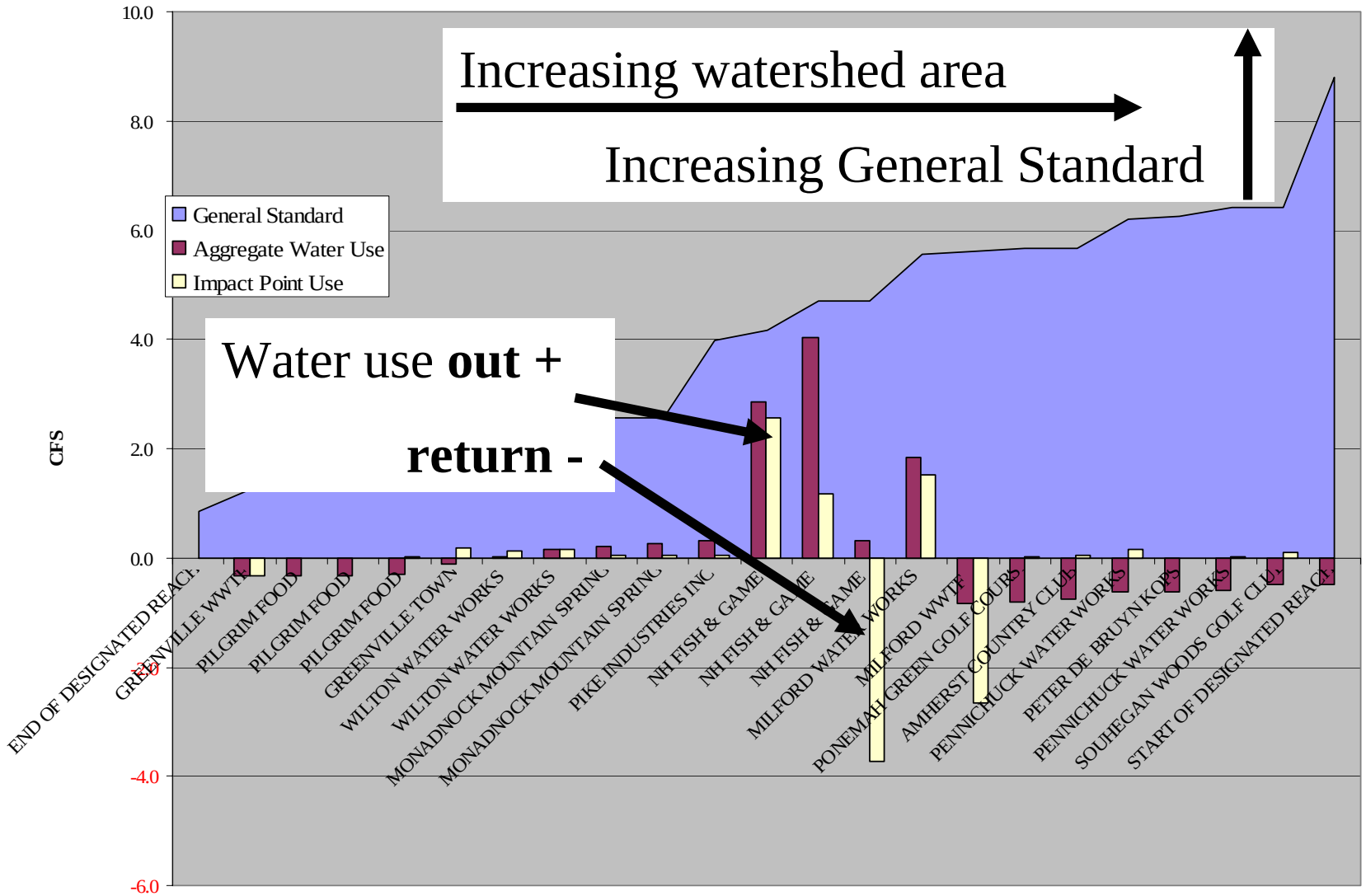
Task 5

- Understand the guiding principles of
  - Natural Flow Paradigm,
  - biological integrity, and
  - Target Fish Community
- Understand the general assessment process
- Attend the Public Hearing (Task 6)

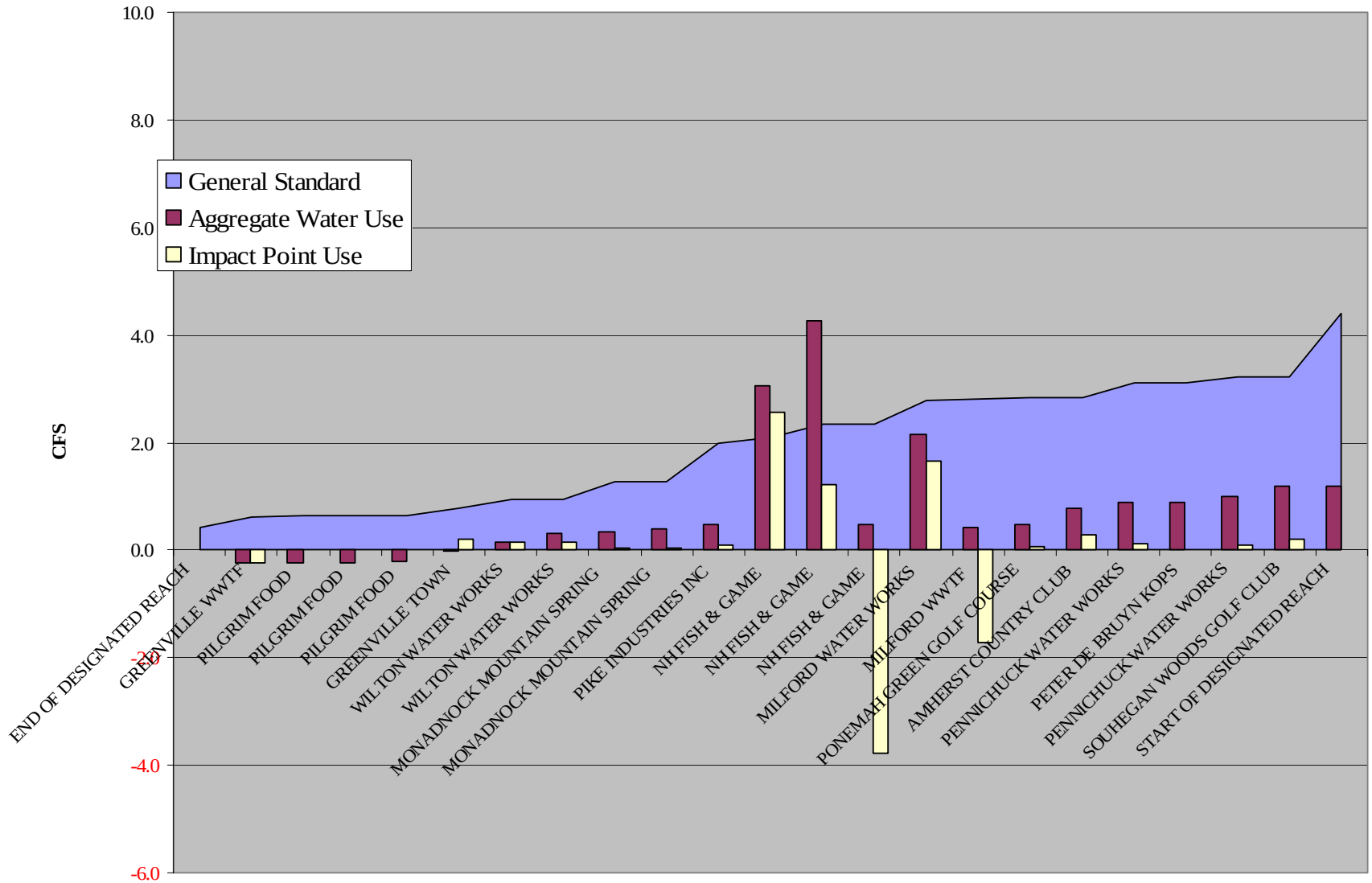
WMP development tasks

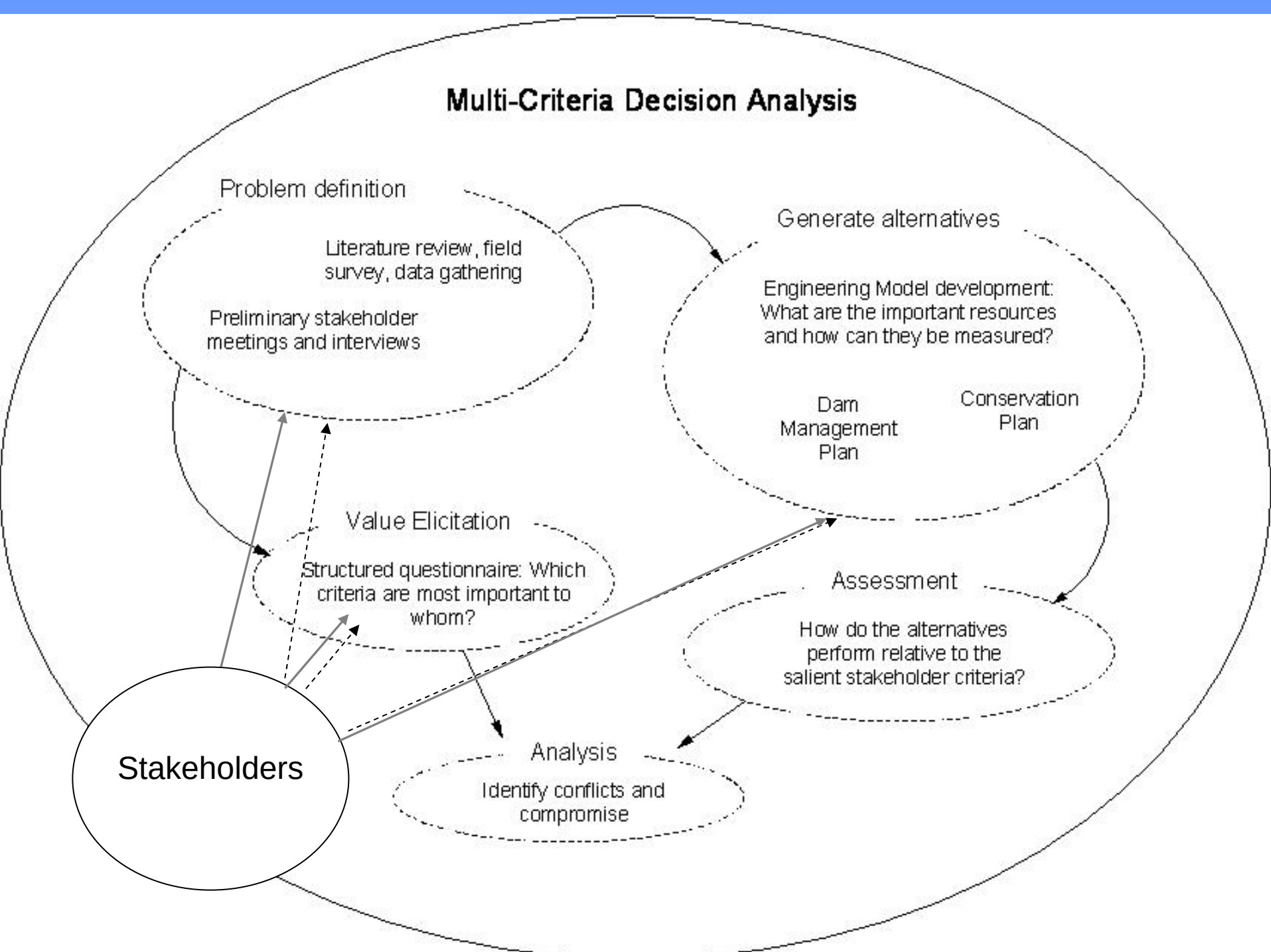
- Task 8. Assessment of Water Use with the Established PISF
- Task 9. Development of WMP Sub-Plans
- Task 10. Proposed WMP

May 2003 Souhegan



August 2003 Souhegan

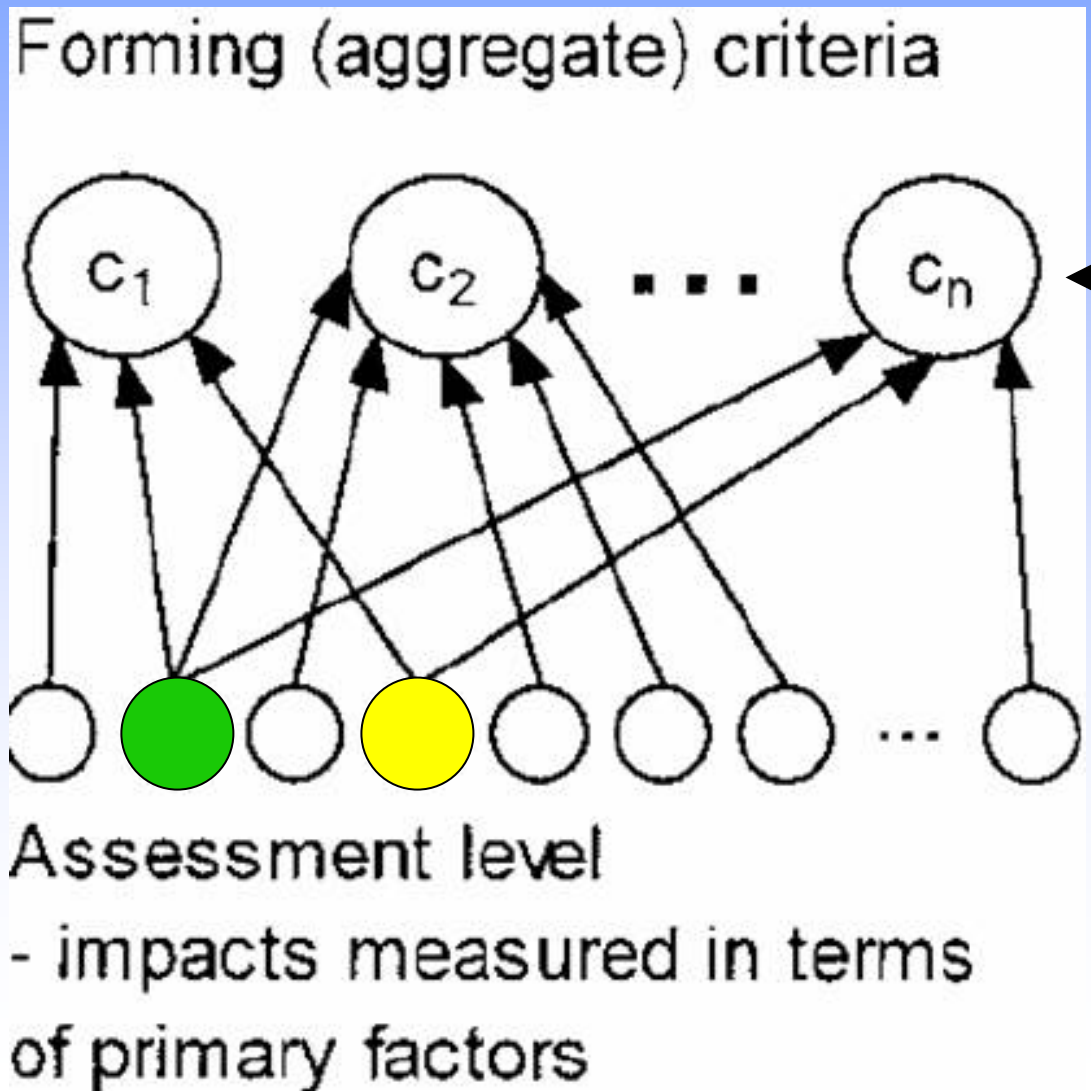



Multi-Criteria Decision Analysis
Problem definition
Literature review, field survey, data gathering
Preliminary stakeholder meetings and interviews
Generate alternatives
Engineering Model development: What are the important resources and how can they be measured?
Dam Management Plan
Conservation Plan
Value Elicitation
Structured questionnaire: Which criteria are most important to whom?
Assessment
How do the alternatives perform relative to the salient stakeholder criteria?
Analysis
Identify conflicts and compromise
Stakeholders

Multi-Criteria Decision Analysis

- List management activities for the WMP
- Ask water users and dam owners preferences
- Compare and balance management needs with preferences
- Repeat interviews with new arrangement
- Revise management plan alternatives
- Repeat as necessary

Which stakeholders prefer which alternatives?



What does WMPAAC do?

WMP development

- Recognize the problem areas and times
- Review possible alternatives lists
- Understand the MCDA process
- Ensure that management responsibilities are evenly distributed
- Attend the Public Hearing (Task 11)

Lamprey Timeline

March 06	Task 2 – Groundwater
November 05	Task 4 – Assessment Methods Report
November 06	Task 5 – PISF Assessments and Proposed PISF Report
December 06	Task 6 – PISF Public Hearing (joint)
February 07	Task 7 – PISF Report for the Lamprey River
March 07	Task 8 – Assessment of Water Use with the Established PISF
April 07	Task 9 – Development of WMP Sub-Plans
May 07	Task 10 – Proposed WMP
June 07	Task 11 – WMP Public Hearing (joint)
August 07	Task 12 – WMP Report for the Lamprey
	DES adopts Water Management Plan for Lamprey

References

- http://www.des.state.nh.us/rivers/instream/
- http://www.unh.edu/erg/
- RSA 483 – Rivers Management and Protection Act
- SB330 – Laws of 2000, Chapter 242
- HB1449 – Laws of 2002, Chapter 278
- HB4 – Laws of 2003, Chapter 319;48-51
- Env-Ws 1900 – “Instream Flow Rules”